

## **Historic, Archive Document**

Do not assume content reflects current scientific knowledge, policies, or practices.



Revised March 1966

## Southern Pine Beetle

By R. J. Kowal, Branch of Forest Insect Research

The southern pine beetle (*Dendroctonus frontalis* Zimm.) is one of the most destructive insect enemies of pine in southern United States and Central America. During major outbreaks, which occur periodically, it kills large quantities of timber from Maryland to Texas and from Mexico to Honduras. Since 1948 outbreaks have been common throughout most Southern States, killing over a billion board feet of pine. A catastrophic out-

break in Honduras killed about 10 billion board feet of pine in 1962-64. Frequently infestations of pine engraver beetles (*Ips* spp.) and the black turpentine beetle (*Dendroctonus terebrans* (Oliv.)) are associated with these outbreaks.

During periods between outbreaks, there is usually some beetle activity at higher elevations, and small clumps of trees are killed here and there in the forest. At lower elevations, however, along the

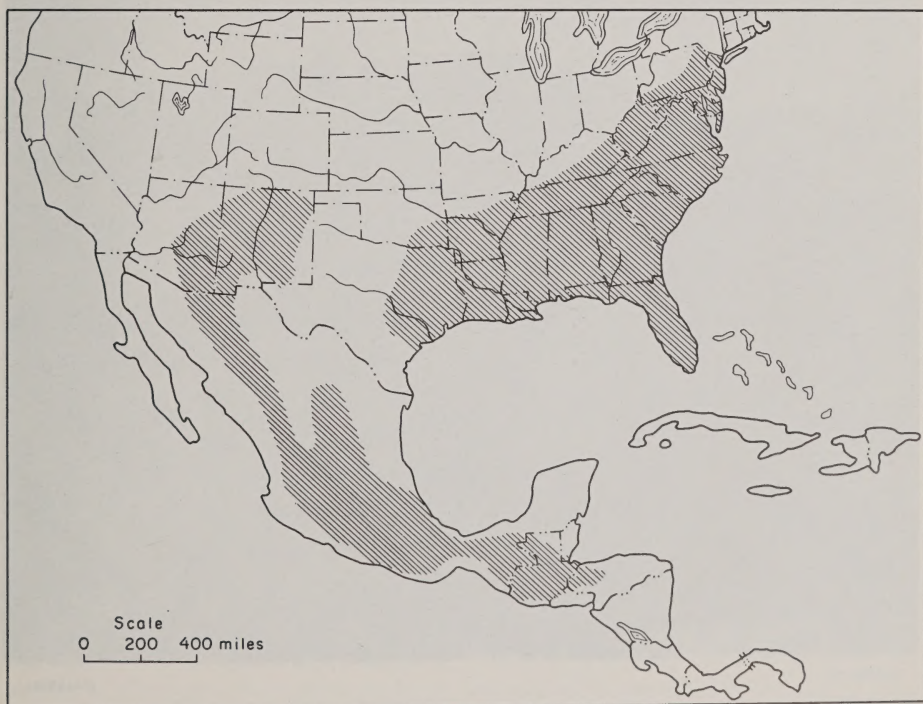


Figure 1.—Distribution of the southern pine beetle in the United States and Central America.



Coastal Plain and in the Gulf States, the beetle virtually disappears.

The underlying causes of southern pine beetle outbreaks are not fully understood. It appears likely that they are caused by conditions that favor an increase in the vigor and size of beetle populations and are unfavorable for host trees. Drought, overstocked stands, absence of natural enemies, stand disturbances, and similar conditions may be involved.

### Hosts

The beetle attacks all yellow pines; and also white pine, spruce pine, red pine, and red spruce. At-

tack is frequently unsuccessful on white pine, usually because of heavy exudation of pitch. When beetles attack red spruce they excavate short tunnels and soon die. Shortleaf, loblolly, Virginia, and pitch pines appear to be preferred to slash and longleaf.

### Evidence of Attack

The presence of a southern pine beetle outbreak is usually indicated by discoloration of the crowns of infested trees. Discoloration begins with the yellowing of needles in the upper crown, and progresses rather rapidly over the whole crown, with the fading needles soon turning to a reddish brown. Us-



F-486341

Figure 2.—A kill or "hot spot" of timber infested by the southern pine beetle. The narrow band of light-colored trees in the center of the picture consists of beetle-attacked pines.





F-486342

Figure 3.—Array of winding egg galleries made by beetles in the bark of pine.



ally large groups of trees are affected; seldom as few as one or two (fig. 2). Examination of the trunks of the discolored trees reveals small yellowish-white masses of pitch called "pitch tubes," one-fourth to one-half inch in diameter. These pitch tubes mark the points of beetle attack. In unusually dry weather, however, there may be no pitch, or only mere traces of it, under bark scales where the beetle bored into the tree. When this occurs, the only evidence of attack may be reddish-brown boring dust lodged in bark crevices and in cobwebs on the trunks, or at the base of the tree.

Removal of a piece of the bark from an infested pine will reveal an array of winding galleries on the inner bark and on the wood surface, a characteristic which clearly distinguishes the presence of the southern pine beetle from any other pine bark beetle in the South (fig. 3). If the attack is recent, there may be some adults in the egg galleries or very tiny, whitish larvae near the galleries. In older attacks, most of the brood will be within the bark.

## Description

In its development the southern pine beetle passes through the egg, larval, pupal, and adult stages. The egg (fig. 4, *A*) is pearly white and barely visible to the naked eye. It hatches into a tiny, whitish, legless larva with a glossy, reddish-brown head; the body is wrinkled and curved (fig. 4, *B*). The larva transforms into the resting stage or pupa (fig. 4, *C*) which is pure white and very fragile, then into the adult

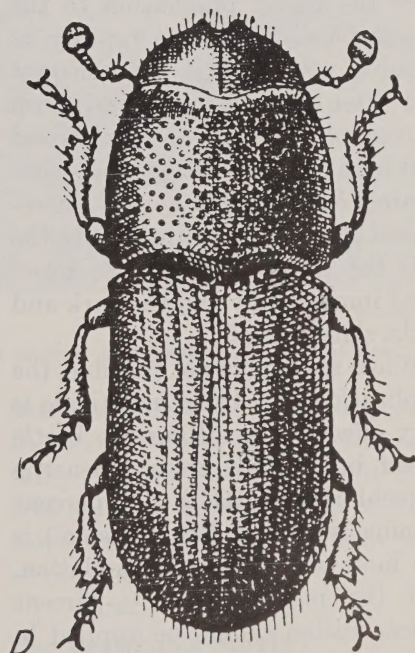
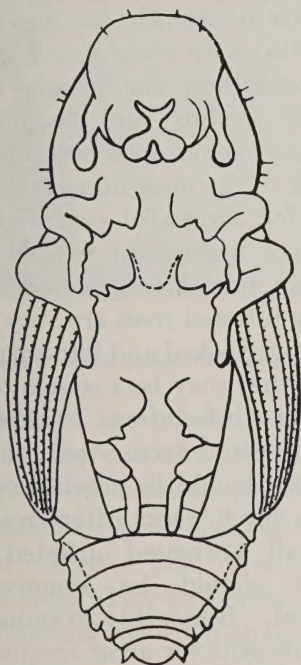
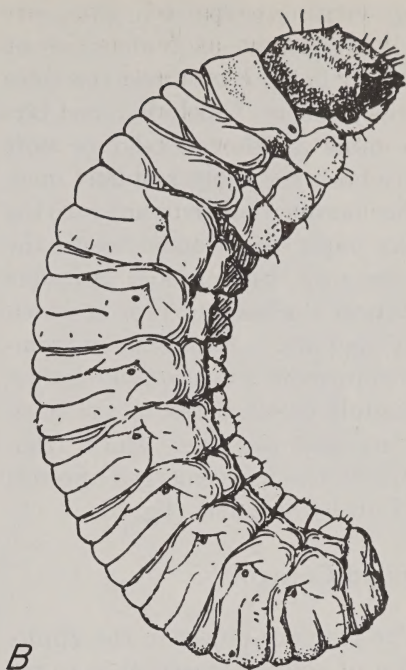
stage. The young adult beetle is soft and whitish in color, but soon hardens and darkens. Older beetles are a dull, dark brown, and their wings are a lighter shade than the foreparts of their bodies. The beetle is short legged, stout, and about one-eighth inch long. The forepart of its head is notched, and the hind end of its body is rounded (fig. 4, *D*).

## Life History

The insect overwinters in the bark in the egg, larval, pupal, and adult stages. In the U.S. beetles of overwintering broods begin to emerge and attack trees in the spring (April-May) about the time dogwood is in full bloom. The life cycle from egg to adult requires 30 to 40 days; 4 to 6 generations are produced a year (up to 7 in Honduras) with some overlapping. Beetle populations and activity generally reach a peak in late summer and early fall. Activity usually ceases by November; however, beetle flights and attacks do occur in winter during prolonged warm spells, even at higher elevations in the mountains. The number of beetles may increase as much as tenfold in a single season.

## Habits

Southern pine beetles usually attack the midtrunk of a tree first, then "fill in" both upward and downward. While larger trees are more commonly attacked, trees as small as 2 inches in diameter also may be infested. When beetles attack they bore through the bark to the wood where they then excavate



F—486343

Figure 4.—Stages of the southern pine beetle: A, egg; B, larva; C, pupa; D, adult.



long winding galleries in the inner bark. Eggs are laid in niches about one-half inch apart along the sides of the gallery. Newly hatched larvae mine in the phloem or soft inner bark for about one-half inch. Older larvae mine outward into the corky bark. In about 4 weeks the larvae stop feeding and excavate cells near the bark surface in which they pupate. Pupation is completed in about 1 week at which time the adult beetle bores to the bark surface and emerges. Bark from which beetles have emerged appears as if hit by birdshot (fig. 5).

### Applied Control

The primary object in the application of control measures is to reduce the beetle population to the lowest possible level as rapidly as possible. Salvage is the cheapest and often the most practical form of control. It must be emphasized that in salvage operations *trees containing beetle brood should be removed first and promptly*. At the mill the material should be processed immediately and the bark and barks slabs burned.

When salvage is not possible, the application of a toxic insecticide is very effective in killing the beetle brood in infested trees. Benzene hexachloride (BHC)  $\frac{1}{4}$  percent gamma isomer in No. 2 fuel oil is the most satisfactory formulation. (In the mountains a  $\frac{1}{2}$ -percent concentration should be applied in the wintertime to provide longer lasting residual action.) The spray solution can be prepared from oil concentrates available on the market. Since most of these concen-

trates contain 1 pound of the gamma isomer of BHC per gallon, the  $\frac{1}{4}$ -percent spray solution is prepared by adding 1 part of the concentrate to 56 parts of oil (by volume). In employing this control method, trees are felled, and a coarse spray of the insecticide is applied until the bark is wet and dripping. It should never be applied to wet bark. **Caution: Care should be taken to avoid prolonged contact of benzene hexachloride with the skin. This chemical may be absorbed by the skin and produce harmful effects.**

In small, localized outbreaks where it is not feasible to salvage or spray, infested trees should be felled, limbed, and the brood killed by exposing the infested trunks to the heat of the sun; the logs should be rolled over every 2 or 3 days to insure killing the insects on all sides. Peeling and burning the bark also gives good control.

One of the most important measures for successful control of the beetle is a check of treated areas. During initial control operations, newly infested trees are very likely to be overlooked and left untreated. If so, they may be a source of continuing infestation. Therefore, areas treated from April through October should be checked every 3 weeks for 9 weeks after treatment and all untreated infested trees found should be removed or sprayed. Bimonthly examinations are sufficient for areas treated during the winter.

### Natural Control

Natural enemies, including insect parasites, predators, diseases, and





F-486344

**Figure 5.—Emergence holes of adults of the southern pine beetle in the bark of pine.**

woodpeckers, rarely have a notable effect on the southern pine beetle during severe outbreaks, although they undoubtedly do exert some degree of control. The full effect of these biological control factors and the conditions under which they are most effective have never been determined.

Perhaps the most effective of all natural control factors is low winter temperatures. When tempera-

tures approach 0° F. and persist for several days, high beetle mortality results. This form of control occurs most commonly at high elevations and in the northern part of the insect's range.

### **Use Pesticides Safely**

If you use insecticides, handle them with care. Follow the directions and heed all the precautions on the container label. If insecti-

cides are handled or applied improperly, or if unused portions are disposed of improperly, they may be injurious to humans, domestic

animals, desirable plants, honeybees and other pollinating insects, fish, and wildlife. Also they may contaminate water supplies.



*Use Pesticides Safely*  
FOLLOW THE LABEL

U.S. DEPARTMENT OF AGRICULTURE